

RECORDS OF FLEAS (SIPHONAPTERA) OF CARNIVORES FROM IDAHO

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Abstract. Records of fleas from carnivores trapped at six localities in Valley county, Idaho, during November through February, 2002–2004, are presented. Additional records collected from small mammals by the senior author over a period of 26 years are also included. Twenty-eight species of fleas representing 24 genera and 6 families are documented. Three new state records [*Delotelis telgoni* (Rothschild, 1905) from Idaho County, *Nearctopsylla hyrtaci* (Rothschild, 1904) from Valley County, and *Peromyscopsylla hamifer vigenis* (Jordan, 1937) from Valley and Idaho counties] and 18 additional new county records are reported (15 for Valley County and 3 for Idaho County).

Key Words: Siphonaptera, carnivore fleas, Idaho

Few studies have been conducted to assess the flea fauna in Idaho. Most noteworthy are those of Allred (1968, 1971) from the National Reactor Testing Station (currently the National Engineering Laboratory located in Bingham, Bonneville, Butte, Clark, and Jefferson counties), Hubbard (1943, 1947), Lewis et al. (1988), and Yensen et al. (1996). Saunders (1978) provided a preliminary checklist, while Baird and Saunders (1992) published a comprehensive checklist. In the latter, Baird and Saunders report descriptions of nine currently valid taxa from Latah (seven), Elmore (one), and Fremont (one) counties and listed ten species from Valley County.

Eads et al. (1979) demonstrated the extreme diversity (18 species) encountered on only three species of carnivores [*Lynx rufus* (Schreber, 1777), *Bassaricus astutus* (Lichtenstein, 1830) and *Martes americana* (Turton, 1806)] in Larimer County, Colorado. Flea species listed by Eads et al. are all accidental associations reflecting carnivore-

prey relationships, e.g., bobcats [*L. rufus*] acquiring the fleas (*Cediopsylla inaequalis* ssp.) off the animals they routinely feed upon (lagomorphs). Although a well known concept, few studies have focused on the diversity of fleas found on carnivores to assess specific flea fauna. We report similar diversity and cite new county and state records for Idaho. The senior author opportunistically collected in Valley County sporadically over 26 years. These records are also included.

MATERIALS AND METHODS

During the winter months of November through February 2002–2004, James Bacon, a resident fur trapper of McCall, Valley County, Idaho, trapped fur-bearing mammals. Larger animals, e.g., bobcats, foxes, and coyotes, were trapped with No. 1½ jump traps and American martens (*M. americana*) were trapped with No. 1 long spring traps. Traps were baited with carcasses of animals skinned from previous

catches and were checked within 48 hours after sets. Captured animals were skinned, and their pelts were immediately rolled up, placed in plastic bags, and put into a freezer for later processing. All pelts, except those of martens, were stored in individual bags. Marten pelts were bagged singly or as multiples when the number captured in a day exceeded more than one. Following the trapping season, processing of pelts was completed and the pelage and bags were examined for fleas. Fleas were preserved in 80 percent ethanol, processed by conventional mounting techniques, and identified by the senior author.

Carnivore trapping localities in Valley County included an area between Payette Lake and Upper Payette Lake, 45°05'N, 116°03'W (1), vicinity of Brundage Mountain, 45°01'N, 116°07' (2), Lake Fork Drainage on the North Fork of Lake Fork, 44°07'N, 115°57'W (3), Lake Fork Drainage, North Fork of Payette River, 44°51'N, 116°04'W (4), South Fork of the Salmon River, Forest Service Trail #50674, 44°53'N, 115°42'W (5), and South Fork of the Salmon River near Warm Lake, 44°41'N, 115°42'W (6). Fleas were also taken from two cougars [*Puma concolor* (Linnaeus 1771)] from the Gold Fork area, near Donnelly 44°41'N, 115°56'W (7) and from the West Mountains, ~44°30'N, 116°05'W (8) by Craig Derrick, a local taxidermist (Cascade, Idaho). These localities (numerals in parentheses) precede each record under "Carnivore Records." New county and state records are indicated by single and double asterisks, respectively. Specific records collected by the senior author are listed under the category "Miscellaneous Records." All localities are from Valley County except for a few noted from Idaho County under Miscellaneous Records. Mammal synonymies follow those of Wilson and Reeder (1993). Fleas are retained in the personal collection of the senior author.

RESULTS AND DISCUSSION

Ceratophyllidae

Aetheca wagneri (Baker, 1904)*

Miscellaneous records.—Payette Lake, (45°N, 116°05'W), ex *Peromyscus maniculatus* (Wagner, 1845), 11 September 1997, 2 ♂; Upper Payette Lake, (45°08'N, 116°01'W), ex *P. maniculatus*, 13 August 1997, 5 ♂.

Amardix bitterrootensis bitterrootensis (Dunn, 1923)*

Carnivore records.—(1), ex *M. americana*, 20 December 2002, 1 ♀. (4), ex *Vulpes vulpes* Linnaeus, 1758, 3 November 2003, 1 ♀. (5), ex *M. americana*, 28 January 2004, 1 ♂.

Remarks.—This flea is rare in collections, possibly because it is a winter flea found at high elevations occurring primarily on pikas [*Ochotona princeps* Richardson, 1828)] whose habitats are snow-covered during most of the winter months. Hubbard (1941) reported 17 ♂ and 13 ♀ from 100 pikas, seldom obtaining more than one on any individual animal. There are a number of records also from the bushy-tailed woodrat [*Neotoma cinerea* (Ord, 1815)], which often lives in close association with pikas in rocky slopes. Only one report (Holland, 1985) indicates a carnivore host (*Mustela erminea invicta* = *M. erminea* Linnaeus, 1758). It is not surprising to find this flea during the winter months from carnivores that feed on both pikas and *N. cinerea* in our trapping areas. This is noted by the large numbers of woodrat fleas (see *Orchopeas agilis*) and one pika flea (see *Ctenophyllus armatus armatus*) collected from *M. americana*. A curious record of 10 ♂ and 13 ♀ of *A. b. bitterrootensis* from a single *Mus musculus* Linnaeus, 1758 was noted by Holland (1985) (season not listed).

Amonopsyllus ciliatus kincaidi (Hubbard, 1947)*

Miscellaneous records.—Wagon Wheel Road (44°58'N, 116°06'W), ex *Tamiasciurus hudsonicus* 4 August 1998, 2 ♀.

Ceratophyllus niger C. Fox, 1908*

Miscellaneous records.—Little Payette Lake (44°56'N, 116°02'W), ex Woodpecker nest cavity (1.25 inch opening), 27 May 1996, 2 ♀; ex Woodpecker nest cavity (1.5 inch opening), 28 May 1996, 1 ♂, 1 ♀.

Eumolpianus eumolpi (Rothschild, 1905)

Miscellaneous records.—Wagon Wheel Road (44°58'N, 116°06'W), ex *Spermophilus lateralis* (Say, 1823), 4 August 1998, 3 ♂; ex *T. hudsonicus*, 3 ♂.

Foxella ignota ignota (Baker, 1895)

Carnivore records.—(1), ex *M. americana*, 20 December 2002, 5 ♀ and ex *V. vulpes*, 5 December 2002, 1 ♀. (2), ex *M. americana*, 6 November 2003, 1 ♀. (5), ex *M. americana*, 14 December 2003, 2 ♀; and ex *L. rufus*, 19 December 2003, 1 ♂. (6), ex *M. americana*, 1 January 2003, 2 ♀. (7), ex *P. concolor*, 20 December 2002, 1 ♀.

Miscellaneous records.—North edge of Little Payette Lake (44°56'N, 116°02'W), 1,555 m, ex *Thomomys bottae* (Eydoux and Gervais, 1836), 27 and 29 May 1996, 3 ♂, 2 ♀; McCall (44°53'N, 116°06'W), 1,520 m, ex *T. bottae*, 13 and 14 July 2000, 2 ♂, 6 ♀.

Remarks.—The common host for this flea is the pocket gopher (*Thomomys* sp.). The senior author has trapped this plentiful host species in several of the trapping areas. It is smaller than varieties occurring at lower elevations and thus creates burrows with very small diameters that would preclude entry of an animal as large as *M. americana*. The data suggest that martens prey on pocket gophers frequently. During the winter months, pocket gophers frequently leave their subterranean burrows extending their tunnel systems into the strata of snow (evidenced by tubes of earth left behind on the ground's surface following spring thaws). This perhaps provides an added opportunity for martens as well as other carnivores to prey upon them.

Baird and Saunders (1992) reported a

single male of *F. ignota recula* (Jordan and Rothschild, 1915) from Valley County (not examined). A single male of 13 specimens from carnivores and 5 males of 15 specimens from *T. bottae* represents *F. i. ignota* (not *F. i. recula*) based on diagnostic criteria noted in Holland (1985). Female *F. ignota* subspecies are indistinguishable and are only tentatively assigned in our study to the nominate subspecies.

Megabothris abantis (Rothschild, 1905)

Miscellaneous records.—Josephine Lake, 2,287 m, Idaho Co. (45°13'N, 115°58'W), ex *Clethrionomys gapperi* (Vigors, 1830), 23 October 1999, 3 ♂, 1 ♀; ex *Microtus* sp., 1 ♂, 5 ♀; Upper Payette Lake (45°08'N, 116°01'W), ex *Microtus* sp., 13 August 1997, 1 ♀.

Remarks.—Baird and Saunders (1992) recorded this species in Valley County from American mink (*Mustela vison* Schreber, 1777); however, it had not been reported previously from Idaho County.

Monopsyllus vison Baker, 1904
(Fig. 1)

Carnivore records.—(3), ex *M. americana*, 10 November 2003, 1 ♀ (1 ♂ without host, date, or locality data).

Miscellaneous records.—NW of Wagon Wheel Road, (44°58'N, 116°06'W), ex *T. hudsonicus*, 27 May 1996, 1 ♂, 5 ♀, 4 August 1998, 1 ♀, and ex woodpecker nest cavity (1.5 inch hole), 28 May 1996, 1 ♀.

Remarks.—Haas and Wilson (1982) found *M. vison* to be the dominant flea infesting red squirrel (*T. hudsonicus*) nests in Alaska. Holland (1985) also listed extensive records (some inclusive of Haas and Wilson's work) of *M. vison* on red squirrels. The red squirrel is the main staple of *M. americana*, but only two specimens of *M. vison* were recovered in our study. This may be explained in Fig. 1, which is assembled from host records compiled in Holland (1985). Only specimens of *M. vison* taken from *T. hudsonicus* are included in Fig. 1, while those from nests, predators, and mis-

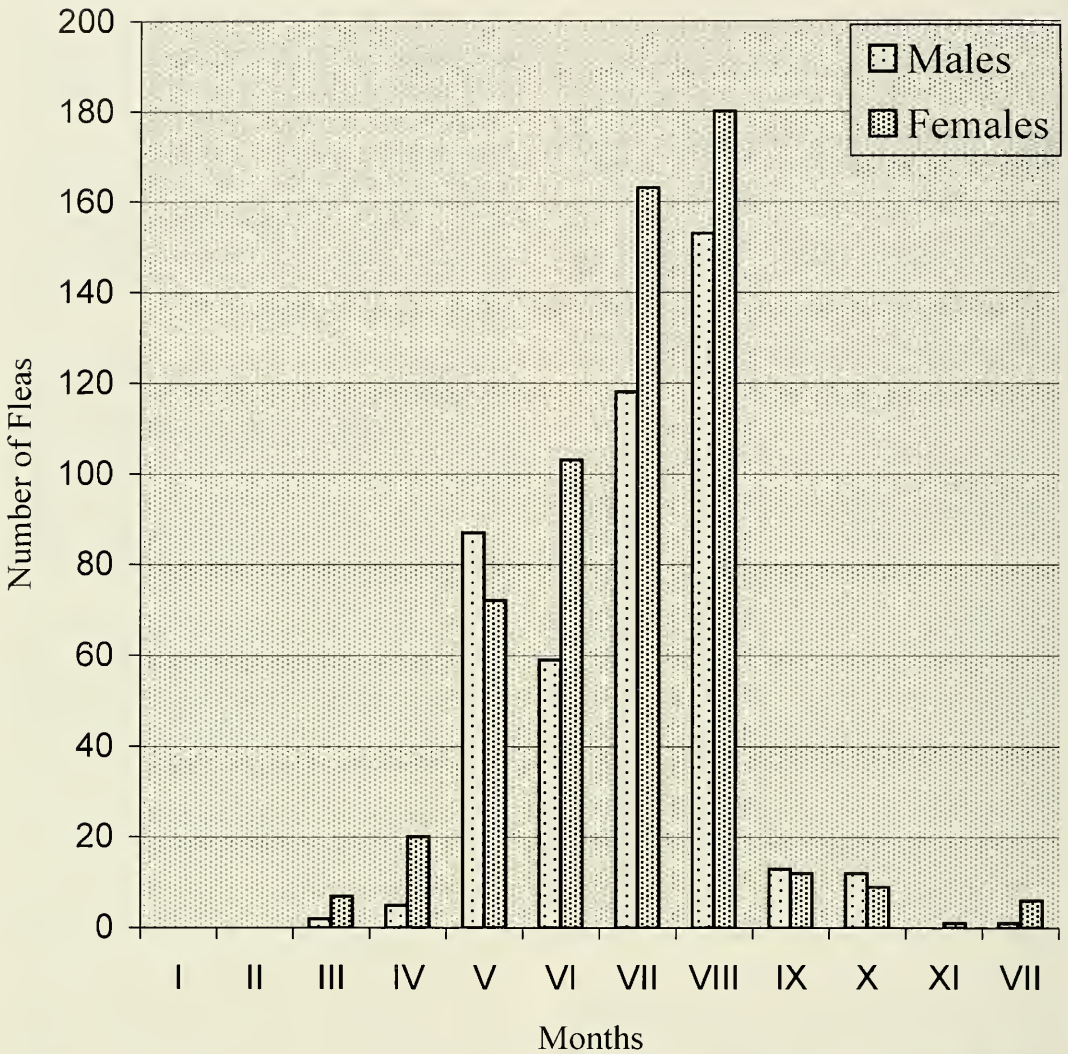


Fig. 1. Seasonal abundance of males and females of *Monopsyllus vision* north of the U.S. and Canadian border (raw data from Holland 1985).

cellaneous other hosts are excluded because they are considered accidental associations. Populations of *M. vision* are minimal during the winter months. Among Holland's records, *M. americana* was cited as a host to *M. vision* only four times. These were during the months of June (1 ♂), October (4 ♂, 1 ♀), and November (3 ♂, 1 ♀). The occurrence of *M. vision* on martens primarily during the winter months might be reflective of: 1) increased trapping by fur

trappers during winter months; 2) the marten's diet of red squirrels increases during the heavy snow-cover of winter (even though flea numbers are low) when other prey are scarce; or 3) a combination of both. The sex ratio (male/female) of 1,025 adults from Holland's records (Fig. 1) is 1:1.29. Valley County records in Baird and Saunders (1992) were collected from an American mink (*M. vision*) and *T. hudsonicus*.

Opisodasys keeni (Baker, 1896)*

Miscellaneous records.—McCall (44°53'N, 116°06'W), ex *P. maniculatus*, 11 September 1997, 1 ♀; Upper Payette Lake (45°08'N, 116°01'W), ex *P. maniculatus*, 13 August 1997, 1 ♂.

Orchopeas agilis (Rothschild, 1905)*

Carnivore records.—(1), ex *M. americana*, 20 December 2002, 1 ♀; 4 November 2003, 3 ♂, 13 ♀. (2), ex *M. americana*, 6 November 2003, 1 ♂. (3), ex *M. americana*, 10 November 2003, 1 ♀. (4), ex *M. americana*, 10 November 2003, 1 ♂. (5), ex *L. rufus*, 10 January 2004, 1 ♀, 4 February 2004, 1 ♂, 1 ♀; ex *M. americana*, 20 December 2003, 5 ♀, 14 December 2003, 5 ♂, 13 ♀, 6 January 2004, 1 ♂, 3 ♀, 28 January 2004, 13 ♂, 19 ♀. (6), ex *M. americana*, 1 January 2003, 1 ♂ (1 ♂, 1 ♀ without host, date, or locality data).

Remarks.—*Orchopeas agilis* was given full specific status by Lewis (2000). This flea is a common and widespread species occurring on woodrats. *Neotoma cinerea*, a high elevation species, is the sole species occurring in the trapping areas of this study. Holland (1985) also found this species commonly on *N. cinerea* in southern British Columbia and Alberta. The distribution of this species extends from these two Canadian provinces to western Texas, and the southern borders of New Mexico and Arizona. *Neotoma cinerea* is the primary host throughout its range, but at lower elevations it readily parasitises other species of woodrats (Morlan, 1955). The bushy-tailed woodrat appears to be a significant part of the diet of *M. americana*.

Orchopeas caedens (Jordan, 1925)

Carnivore records.—(1), ex *V. vulpes*, 5 December 2002, 2 ♂, 1 ♀; ex *M. americana*, 4 November 2003, 1 ♀. (2), ex *M. americana*, 6 November 2003, 2 ♀. (3), ex *M. americana*, 10–12 November 2003, 1 ♂, 2 ♀. (4), ex *V. vulpes*, 3 November 2003, 1 ♂. (5), ex *L. rufus*, 19 December 2003, 2

♀; 30 December 2003, 4 ♀, 4 February 2004, 1 ♀; ex *M. americana*, 14 December 2003, 5 ♀, 20 December 2003, 1 ♂, 3 ♀, 6 January 2004, 1 ♀, 28 January 2004, 1 ♀. (6), ex *M. americana*, 1 January 2003, 3 ♀ (1 ♂, 4 ♀ without host, date, or locality data).

Miscellaneous records.—Wagon Wheel Road, (44°58'N, 116°06'W), ex *T. hudsonicus*, 4 August 1998, 1 ♂; McCall, (44°53'N, 116°06'W), ex *T. hudsonicus*, 27 May 1996, 1 ♂, 3 ♀.

Remarks.—Lewis (2000) synonymized *Orchopeas caedens durus* Jordan, 1929, with *O. caedens*. Haas and Wilson (1982) listed this flea second only to *M. vison* in red squirrel nests in Alaska. Females of *O. agilis* and *O. caedens* are difficult to distinguish and, based on males, both were present simultaneously on *M. americana* throughout the trapping areas. Based on the key (couplet 4) provided in Lewis (2000), the frontal setal row has one or no setae in *O. caedens*, while *O. agilis* always has two or more. In the latter, there were seldom more than two in Valley County populations, and the second more ventral seta was often minute. The caudal margin of st. VII (seventh sternite) is highly variable in both species; however, based on the dicotomy created by the frontal setal row, specimens attributed to *O. caedens* usually have an acutely pointed dorsal lobe on the caudal margin of the st. VII.

Oropsylla idahoensis (Baker, 1904)*

Miscellaneous records.—Silver Creek, near Silver Creek community hot springs plunge (44°20'N, 115°47'W), ex *Spermoophilus columbianus* (Ord. 1815), 13 and 15 July 1974, 1 ♂, 1 ♀.

Oropsylla tuberculata tuberculata
(Baker, 1904)

Miscellaneous records.—Silver Creek, near Silver Creek community hot springs plunge (44°20'N, 115°47'W), ex *S. columbianus*, 15 July 1974, 2 ♂.

Remarks.—Baird and Saunders (1992)

recorded two pairs of this flea from *S. columbianus* in Valley County.

Thrassia pandorae pandorae
Jellison, 1937

Miscellaneous records.—Silver Creek, near Silver Creek community hot springs plunge (44°20'N, 115°47'W), ex *S. columbianus*, 13 and 15 July 1974, 1 ♂, 7 ♀.

Remarks.—Stark (1970) recorded *T. p. pandorae* from Valley County, and Baird and Saunders (1992) repeated Stark's record.

CTENOPHTHALMIDAE

Catallagia decipiens Rothschild, 1915*
(Figs. 2A–C, G, H)

Miscellaneous records.—Josephine Lake, 2,287 m, Idaho Co. (45°13'N, 115°58'W), ex *Microtus* sp., 23 October 1999, 1 ♂. Upper Payette Lake (45°08'N, 116°01'W), ex *P. maniculatus*, 13 August 1997, 1 ♀.

Remarks.—These are the first records for both Idaho and Valley counties. This female has an aberrant spermatheca, which resembles that of *Delotelis telgoni* (Rothschild, 1905) but is smaller (Figs. 2C, E). The hilla does not project into the bulga, as in all species of *Catallagia* Rothschild, 1915 (Fig. 2B). The spiracle on t. VIII is characteristic of *Catallagia* (compare spiracle of *Catallagia* and *Delotelis* Figs. 2F–H) and there are only two rows of frontal setae versus the typical three in *Delotelis* (see Figs. 2A, D). Similar observations of an aberrant spermatheca were noted by Hubbard (1947) and these were illustrated in Hopkins and Rothschild (1962) for *Catallagia moneris* Jordan, 1937 and *Catallagia motei* Hubbard, 1940. Hubbard (1947) synonymized each of these species with *C. decipiens* and *C. charlottensis* (Baker, 1898), respectively. Hubbard termed these anomalous specimens, whose characters resulted in descriptions of distinct species, “dimorphic forms” of valid taxa. *Delotelis* is remarkably similar to the genus *Catallagia* (it may eventually prove to represent a subgenus of

Catallagia as may also the Mexican genus *Strepsylla* Traub, 1950). Perhaps these three aberrant specimens are merely freak genetic expressions of genes common to both *Catallagia* and *Delotelis*.

Delotelis telgoni (Rothschild, 1905)**
(Figs. 2D–F)

Miscellaneous records.—Josephine Lake, 2,287 m, Idaho Co. (45°13'N, 115°58'W), ex *C. gapperi*, 23 October 1999, 1 ♀.

Remarks.—This is a new state record. The flea has a broad distribution from British Columbia to New Mexico; however, it is extremely rare in collections. Rarely are more than one or two specimens collected from a host. Jellison and Senger (1973) listed 8 ♂ and 20 ♀ from Missoula County, Montana, also from *C. gapperi*.

Epitedia wenmanni (Rothschild, 1904)*

Carnivore records.—(2), ex *M. americana*, 6 November 2003, 1 ♀.

Megarhthroglossus divisus (Baker, 1898)*

Carnivore records.—1 ♀ without host, date or locality data.

Nearctopsylla hyrtaci
(Rothschild, 1904)**

Carnivore records.—(1), ex *M. americana*, 20 December 2002, 1 ♀, 4 and 10 November 2003, 2 ♀.

Remarks.—Although Holland (1985) reported this species numerous times from various species of mustelids, it is primarily a parasite of shrews (Soricidae). It has been reported in Montana (Jellison and Senger 1973, Kohls 1950, Senger 1966), Utah (Kucera 1995, Tipton and Allred 1952), and Wyoming (Wiseman 1955) but is seemingly more prevalent to the north in British Columbia (Holland 1985). It appears from the records that small mustelids, such as weasels, prey on soricids more frequently than do pine martens. Two females of *Nearctopsylla princei* Holland and Jameson, 1950, reported in Larimer County, Colorado, by Eads, et al. (1979) may represent *N. hyrtaci*.

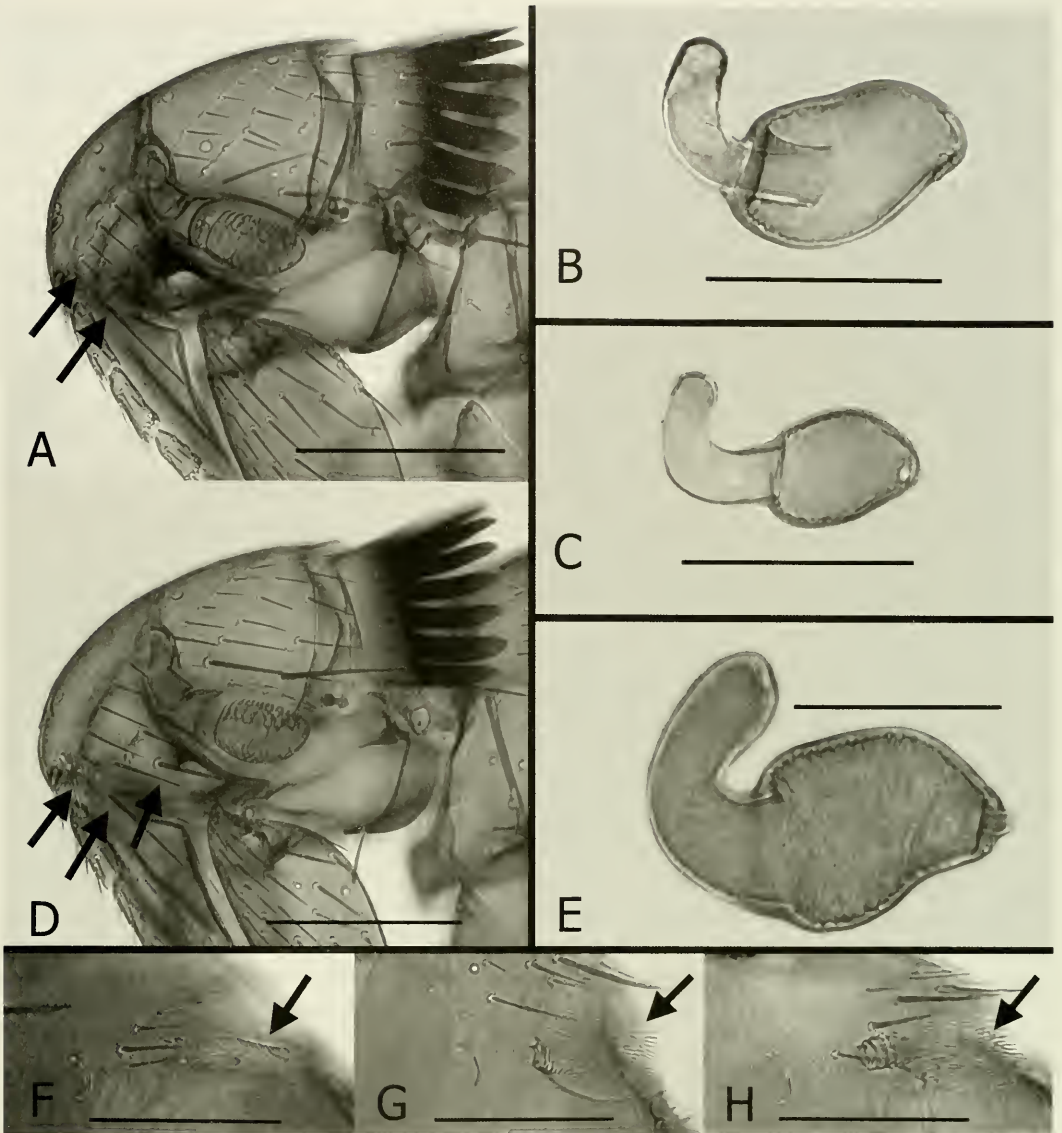


Fig. 2. A–C, *Catallagia decipiens*, female. A, Head, arrows depicting two preantennal frontal rows. B, Normal sperm theca. C, Aberrant spermatheca. D–F, *Delotelis telgoni*, female. D, Head, arrows depicting three frontal rows. E, Spermatheca. F, Eighth spiracular fossa. G–H, *C. decipiens*, female. G, Eighth spiracular fossa. H, Eighth spiracular fossa of female with aberrant spermatheca. Scale: A and D = 100 microns; B, C, and E–H = 200 microns.

These specimens could not be located for comparison. Females of these two species are very similar (if not indistinguishable) and it is unlikely that the distribution of *N. princei* would be so disjunct as to occur in both the Rocky Mountains and the Sierra

Nevadas considering the isolating barrier of the Great Basin.

Neopsylla inopina Rothschild, 1915*

Miscellaneous records.—Silver Creek, near Silver Creek community hot springs

plunge (44°20'N, 115°47'W), ex *S. columbianus*, 13 and 15 July 1974, 4 ♀.

Remarks.—*Neopsylla inopina* is the only species of this large genus in North America. Holland (1985) reported *S. columbianus* and *S. richardsoni* (Sabine, 1822) as its principle hosts.

Rhadinopsylla (Actenophthalmus) difficilis
Smit, 1957*

Carnivore records.—(1), ex *V. vulpes*, 5 December 2002, 1 ♀. (2), ex *M. americana*, 6 November 2003, 1 ♂, 2 ♀. (5), ex *M. americana*, 6 January 2004, 1 ♀. (6), ex *M. americana*, 1 January 2003, 1 ♀ (1 ♀ without host, date, or locality data).

Miscellaneous records.—Josephine Lake, 2,287 m, Idaho Co. (44°53'N, 115°58'W), ex *Microtus* or *Clethrionomys* nest, 12 September 1997, 1 ♀.

Remarks.—This is a new record for Idaho County. Our material belongs to the subgenus *Actenophthalmus* and is tentatively assigned to *R. difficilis*. Holland (1985) reported similar difficulty in placing Canadian specimens. Smit (1957) described *R. arborea*, *R. difficilis*, *R. linta*, and *R. media* (the latter three each based only on 2–3 specimens), and he re-described the male of *R. fraterna* (Baker, 1895). Each of these species (if valid) potentially occurs in Idaho. Based on the presence of only one seta below the level of spiracles on t. III–VI, our specimens are clearly not *R. fraterna*. The diagnostic characters that Smit used were of little benefit in identifying our material (shape of basimere/telomere and st. IX of males, the caudal margin of st. VII of females, chaetotaxy of tergum VIII, shape of 8th spiracular fossa, and arrangement of genital spines). Tentative assignment to *R. difficilis* is based primarily on Smit's declaration of geographic distribution, although the atrium of the 8th spiracle was very narrow in all specimens which is most similar to that of *R. linta*. Baird and Saunders (1992) recorded a single female of *R. difficilis* from *M. americana*, taken in Valley County but there is no indication of who identified the

specimen. North American material belonging to this subgenus is in need of revision, which surely will result in several synonyms.

HYSTRICHOPSYLLIDAE

Hystrichopsylla dippiei dippiei
Rothschild, 1902*

Miscellaneous records.—Josephine Lake, 2,287 m, Idaho Co. (44°53'N, 115°58'W), ex *C. gapperi*, 23 October 1999, 1 ♂, 2 ♀; *Microtus* or *Clethrionomys* nest, 1 ♂.

Remarks.—The only other record in Idaho was reported by Baird and Saunder (1992) from Boise County.

LEPTOPSYLLIDAE

Ctenophyllus armatus armatus
(Wagner, 1901)

Carnivore records.—(1), ex *M. americana*, 20 December 2002, 1 ♀.

Remarks.—*Ctenophyllus a. armatus* is a well established parasite of pikas.

Peromyscopsylla hamifer vigens
(Jordan, 1937)**

Carnivore records.—(4), ex *V. vulpes*, 3 November 2003, 1 ♂. (1 ♀ without host, date, or locality data).

Miscellaneous records.—Josephine Lake, 2,287 m, Idaho Co. (45°13'N, 115°58'W), ex *Microtus* sp.?, 23 October 1999, 3 ♂.

Remarks.—These are new records for Idaho. Although the distribution of this flea is broad, extending from Montana south to the Jemez Mountains of New Mexico, it is collected infrequently. An exception is the collection from the Jemez Mountains, New Mexico, where Haas (1973) reported 71 ♂ and 88 ♀. He did not specify the source of these specimens but virtually all were collected from animals (personal communication, G.E. Haas). He indicated that he has rarely collected any species of *Peromyscopsylla* from nests, and that they spend most of their time in the fur of their host. Holdenried and Morlan (1956) reported 10 specimens taken from six of 41 voles ex-

amed in Sante Fe County, New Mexico. The preferred host of this flea is species of *Microtus*.

Peromyscopsylla selenis
(Rothschild, 1906)*

Miscellaneous records.—Upper Payette Lake (45°08'N, 116°01'W), 13 August 1997, ex *P. maniculatus*, 1 ♂, ex *Microtus* sp., 1 ♂, 1 ♀.

Remarks.—This species is widely distributed in western North America from Alaska to New Mexico, but is not common in collections.

PULICIDAE

Euhoplopsyllus glacialis lynx
(Baker, 1904)*

Carnivore records.—(5), ex *L. rufus*, 19 December 2003, 3 ♂, 10 ♀, 30 December 2003, 1 ♂, 5 ♀, 10 January 2004, 5 ♂, 10 ♀, 20 January 2004, 2 ♂, 3 ♀, 4 February 2004, 9 ♂, 12 ♀; ex *M. americana*, 28 January 2004, 2 ♀; *V. fulva*, 4 February 2004, 3 ♀.

Remarks.—This rabbit flea occurs primarily on the snowshoe hare (*Lepus americanus* Erxleben, 1777) according to Holland (1985) who also suggested that it might be established on the Canada lynx (*Lynx canadensis* Kerr, 1792) because of the large numbers frequently found on it. Baird and Saunders (1992) reported one record of this species in Latah County, Idaho, from *Felis lynx* = *L. rufus*. Jellison and Senger (1973), in their synopsis of the fleas of Montana, recorded only two records in Missoula County, one each from a bobcat and the Canada lynx. Of the 14 bobcats that were trapped in trapping area (5), only five harbored this flea. Bobcats were not captured in other areas. Records from three carnivorous species, plus significant total numbers of fleas (20 ♂, 45 ♀), suggest that this flea might be widespread in Idaho commensurate with the range of *L. americanus*. This can be validated only with additional collections from larger carnivores and from *L. americanus*.

Pulex irritans Linnaeus, 1758*

Carnivore records.—(1), ex *V. vulpes*, 5 December 2002, 6 ♂, 12 ♀. (2), ex *Canis latrans* Say, 1823, 3 November 2003, 3 ♂, 3 ♀.

Remarks.—This is a cosmopolitan species commonly found on these hosts.

VERMIPSYLLIDAE

Chaetopsylla setosa Rothschild, 1906*

Carnivore records.—(3), ex *M. americana*, 12 November 2003, 1 ♀. (5), ex *L. rufus*, 19 December 2003, 1 ♂, 2 ♀, 30 December 2003, 4 ♂, 1 ♀, 20 January 2004, 1 ♂; *M. americana*, 20 December 2003, 1 ♀, 6 January 2004, 1 ♀. (7), ex *P. concolor*, 20 December 2002, 1 ♂, 1 ♀. (8), ex *P. concolor*, 19 January 2004, 1 ♂ (1 ♀ without host, date, or locality data).

Remarks.—*Chaetopsylla setosa* is considered a parasite of larger carnivores, i.e., black bears and wolverines, while *Chaetopsylla floridensis* (I. Fox, 1939), a closely allied species, occurs on small mustelids, e.g., martens, mink, and ermine (Baird and Saunders 1992, Haas and Wilson 1982, Haas et al. 1978, 1979, 1980, 1982, 1989, Holland 1985, Hopla 1965, and Lewis and Lewis 1994). McDaniel and Easton (1986) reported an interesting record of *C. setosa* on porcupines from South Dakota where bears and wolverines are not known to occur. Jellison et al. (1943) reported this flea from a cougar from Mineral County, Montana (two ♂ and 11 ♀ annotated from cougar in Mineral County in Jellison and Senger (1973) are assumed to be the same record). Three specimens of *C. setosa* collected from two different cougars are new for this host in Idaho. Martens and cougars are accidental hosts for this flea. Although the precise interaction between martens, cougars, and black bears is unknown, occasional intermittent occupation of black bear dens by martens and cougars because of severe winter weather may provide an explanation of how these two animals become infested with *C. setosa*. The low incidence

of marten flea infestations suggest that cougars do not become infested from eating martens.

Our specimens of *C. setosa* were compared with the syntypes of *C. floridensis* (L. Fox, 1939) collected from "Garden truck leaf mold" in Florida and with a series (7 ♂, 2 ♀) reported from *M. americana* by Eads, Campos and Barnes (1979) (all deposited in the NMNH). The aedeagus of these two species is virtually indistinguishable but displays significant variation from one specimen to another within the same species. The flexibility of bilateral membranous lobes associated with the median dorsal lobe creates these variations (compare illustrations of apex of aedeagus Wagner (1936, fig. 4) and Hopkins and Rothschild (1956, fig. 140). The crochet, as illustrated in Johnson (1955, figs. 6–8, is sometimes extended dorso-caudally, uncurling an otherwise obvious "loop." These two morphological variables portray quite different features. Contrary to couplet 5 in the key to the *Chaetopsylla* in Hopkins and Rothschild (1956), both species bear a single long seta at the posterior margin of the eye. This character cannot be used as a distinguishing feature, nor can the morphology of the clasper (basimere and telomere) which also shows considerable variation. *Chaetopsylla setosa* may be distinguished from the closely allied species *C. floridensis* by: 1) its larger size; 2) labial palpi that extend to the middle of the trochanter, or well beyond (7–10 segments versus < 7); and 3) the presence of several anterior rows of setae on t. VIII of the male (exclusive of the primary row of 3–5 large setae).

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